Factors Affecting Adherence to Anti-retroviral Therapy at Kampala International University Teaching Hospital, Bushenyi District, Uganda

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Abstract Complex regimens present significant challenges to both patients and health-care providers with respect to anti-retroviral therapy (ART) treatment adherence. Improper adherence leads to poor suppression of HIV replication in infected cells. High level of ART treatment adherence leads to better viral suppression outcomes. Proper maintenance of ART treatment adherence over time remains a problematic area especially in resource limited settings, including sub-Saharan African countries. The western region of Uganda has been noted to have a high prevalence of HIV patients. This study was therefore undertaken to determine the factors associated with non-adherence among the HIV patients on ART in a teaching hospital in south-western Uganda. Findings of the study revealed that forgetting treatment was the most cited factor. Feeling better after some medication period, being too ill to take medication, stigma associated with taking ART medication, alcohol consumption and drug stock out were also identified to be associated to non-adherence among the study participants. Most of the patients in this study (150/255, 58.8%) had good adherence, followed by those who had fair rates of adherence (60/255, 23.5%). Forty five patients (17.6%) had the least adherence level. Findings also showed that females were most likely to miss their medication. The age groups of 30-39 and 40-49 were the most likely not to adhere to medications compared to the other age groups while the 0-19 and above 50 years age groups were most likely not to miss their medication. The separated patients were more likely to miss medication compared to others. Patients who had attended only primary education and those who attended tertiary level of education were most likely to be non-adherent to medication. Deliberate measures need to be taken to cater for the non-adherent patients. Interventions aimed at the high-risk non-adherence groups need to be specifically developed.

Keywords: ART, adherence, Uganda, factors, human immunodeficiency virus

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1. Introduction

Increasingly complex drug regimens have been brought about by the shift towards the use of highly active antiretroviral therapy (HAART) for treating human immunodeficiency virus (HIV) disease. It has been pointed out that these complex regimens present significant challenges to both patients and health-care providers with respect to adherence. Improper adherence has the consequence of antiretroviral agents not being maintained at sufficient concentrations to suppress HIV replication in infected cells and to lower the plasma viral load [1]. The efficacy of the numerous therapeutic agents for viral suppression in HIV requires that patients with HIV be adherent to their prescribed regimens. In cases where treatment adherence is less than 95%, there exists a substantial risk of failed viral suppression with HIV therapeutic regimens in which an un-boosted protease inhibitor is a component [2,3]. Better viral suppression outcomes have been shown to be attributable to high level of HIV treatment adherence, while less effective viral suppression, drug resistance and reduced survival are all associated with poor HIV treatment adherence [4,5].

Accurate measurement of treatment adherence poses several challenges, although four basic techniques have been developed for quantifying adherence. The patient self-reports technique has the advantages of low cost, flexibility of design, ease of data collection, and the ability to use collected data in determining the reasons why patients are non-adherent. However, the danger of using this technique mostly lies with the chances of over-estimating the adherence level among the HIV patients.

Another major limitation of using the technique is that self-reports only reflect short-term or average adherence. Studies have also shown that self-reports provide inflated estimates of adherence behaviour [6,7,8,9].

The other technique, which uses pill counts to measure adherence, has been used widely. Since pill counts require patients to return the medication package to the clinician, this particular technique has been pointed out to have a number of drawbacks, exemplified by patients' tendency of forgetting the packages or inadvertently discarding them all together. In other extreme cases, patients other than those with HIV, have been reported to engage in "pill dumping" in order to appear adherent. Consequently, the technique has also been found to typically over-estimate the levels of adherence to treatment [1,10]. The third technique used to measure adherence involves assaying of drug levels in patients undergoing treatment in order to measure the last dose taken. The impracticality of this technique lies in its expensive nature and lack of general availability. This limitation can be more felt in rural health centres in resource poor settings. A major loophole in this technique that can be exploited by patients exists in the fact that patients can get more conscientious about taking their medication just before a clinic visit [1].

The fourth technique for measuring adherence involves the use of electronic monitoring systems. One such monitoring system is the Medication Event Monitoring System (MEMS), in which the system is inserted into medication bottle caps. This monitoring system contains a computer chip that records the date and time of opening and closing of the bottle. Data interpretation from this system assumes that a single dose is taken each time the bottle is opened. The major drawback of the system is that it may lead to inaccuracies if multiple doses are removed at once [1]. Another shortcoming of such a system could be the casual opening of the medication bottle just to dump all the medications at once, followed by the meticulous opening and closing of the bottle at the designated dates and time as recommended by the clinician.

The various classes of antiretroviral therapy (ART) are associated with different thresholds of adherence needed to achieve viral suppression and additionally, avoid resistance mutations. The uniqueness of ART agents is that each class of agents has its own relationship between adherence rates and these two key outcome variables. Highly active antiretroviral therapy (HAART) based on a non-nucleoside reverse-transcriptase inhibitor (NNRTI), needs a very high level of adherence to limit the risk of resistance mutations [11]. One study has shown a 4.9% risk of resistance mutations in patients receiving NNRTI-based HAART who dropped below a 75% rate of treatment adherence, while patients treated with HAART with an un-boosted protease inhibitor (PI) as its backbone had a very low mutation risk at that level of adherence. Interestingly, the authors of the study found out that boosted PIs were associated with a mutation risk between un-boosted PIs and NNRTIs at the same adherence rate [12].

It is estimated that Sub-Saharan Africa bears the biggest burden of HIV infection, whereby two-thirds of all persons are infected with the disease. More alarming is the fact that out of 260,000 of child deaths that occurred globally as a consequence of HIV/AIDS in the year 2009,

80% were from Sub-Saharan Africa [13]. In the African context, the causes for non-adherence include long distances to health facilities, availability and affordability of ARVs, lack of money for transport and food, quality of life during ARV treatment, long waiting time at health facilities, and congestion at the health facilities [14,15]. Although implementing programmatic approaches can help resolve some of these factors, such approaches may fail to produce the desired effects due the limited resource nature of the settings [16,17].

Several initiatives have been rolled out in the past to improve adherence. These included training health personnel on ART supply chain management, HIV prevention, clinical care, counseling, community support programs, and use of experienced ART patients (expert clients) who provide support to other patients who are newly commencing treatment [14,18]. Proper maintenance of ART treatment adherence over time remains a problematic area especially in resource limited settings, including sub-Saharan African countries [19].

In Uganda, many health facilities that offer ART services are plagued by the lack of systematic appointment mechanisms. This problem has been noted to cause over-crowding, especially in cases where patients come early in the hope that they will be the first ones to receive healthcare services. In the long run, the quality of services and patient satisfaction with the healthcare service are negatively affected by the subsequent congestion that develops at such health facilities [20,21]. It has previously been recommended that experienced ART patients (expert clients) be fast tracked to the pharmacy and/ or be dispensed therapies that can last them more days in order to ease the congestion at health facilities [20]. Published information concerning the challenges of ART adherence overt time in the African continent remains scanty. The western region of Uganda has been noted to have a high prevalence of HIV patients. For instance, in the south-western region, where the study was carried out, the prevalence was at 8.0% against the country rate of 7.3% in 2011 [22]. This study was therefore undertaken to determine the factors associated with non-adherence among the HIV patients on ART in a teaching hospital in south-western Uganda. The findings of the study are discussed herein.

2. Materials and Methods

2.1. Study Design

The study used a descriptive study design using both quantitative and qualitative methods. Data was collected from randomly selected patients as they visited the HIV clinic at Kampala International University-Teaching Hospital to refill their medication packages. The patients were interviewed about their health beliefs, health system interaction, ARV therapy uptake and reasons for non-adherence.

2.2. Study Site and Population

The study was conducted in the ART clinic of Kampala International University-Teaching Hospital. The hospital is located in the town of Ishaka, in Bushenyi District, south-western Uganda. The study's target population was

all the clients attending ART Clinic in Kampala International University-Teaching Hospital. Two hundred and fifty five (255) patients who gave consent to participate in the study were interviewed.

2.3. Data Collection

This was done with help from the clinic staff. The clinic staffs were useful in identifying and referring the potential eligible clients who had reported for the clinic. The eligible patients were informed about the study and upon understanding of the specifics of the study, their consent was sought. A direct face-to-face interviewer administered questionnaire was used to collect data. The questionnaire consisted of structured and semi structured questions to collect both quantitative and qualitative data. The interview included items on socio-demographic data, treatment and a section on the various factors that could have influenced the patients' adherence to ART. The patients' health passport books were reviewed to confirm the patient report on treatment type, dosage and last date of visit. Other clinical records were reviewed to abstract the number of pills given in the last visit so as to help in calculating the number of missed doses during analysis.

2.4. Data Analysis

Quantitative data were entered into Statistical Package of Social Sciences (SPSS) for analysis. The key variables examined included demographics and other characteristics of the patients and adherence factors. Chi square goodness of fit was done to determine the association between socio-demographic and patient factors with non adherence to HIV medications. A p value of 0.05 or less was considered to be statistically significant.

2.5. Ethical Considerations

Ethical approval to conduct the study was granted by the Institutional Ethics and Review Board of Kampala International University-Western Campus. Permission to conduct the research at the ART clinic was obtained from the superintendent of the ART clinic. Consent was obtained from each patient both verbally and in writing before any interview was conducted. Confidentiality was maintained on all the data that was collected.

3. Results

A total of two hundred and fifty five (255) patients accepted to participate in this study. Most of the patients in this study (202/255, representing 79.2% of the total) were on ARVs. This was followed by those on cotrimoxazole alone (48/255, representing 18.8% of the total), while 5 patients (2%) reported being on other medications. The commonly reported other drugs were TB medications and Dapson. Female participants were one hundred and fifty nine (159/255), representing 62.4% of the total number of participants, while male participants were ninety six (96/255), representing 37.6% of the total number of participants. Among the study participants, 74 (29%) were single, 154 (60.4%) were married, 15 (5.9%) were separated, while 14 (5.5%) were widowed. Table 1 shows the sociodemographic characteristics of the participants.

Table 1. Socio-demographic characteristics of participants and their influence on non-adherence

Factor	Variables(number / non adhering)		X^2 Values	P values	Df (N)
Gender	a) Male	(96 / 43)	0.8303	0.362	1(255)
	b) Female	(159 / 62)	0.830	0.362	
Age	a) 0-19	(11/2)	2.5	0.113	4(255)
	b) 20-29	(139/62)	1.48	0.223	
	c) 30-39	(67/34)	4.63	0.031	
	d) 40-49	(30/5)	8.43	0.0036	
	e) Above 50	(8/2)	0.859	0.859	
Marital status	a) Single	(74/30)	0.001	0.979	3(255)
	b) Married	(154/61)	0.0097	0.94	
	c) Separated	(15/10)	4.567	0.032	
	d) Widowed	(14/4)	2.199	0.138	
Level of education	a) Primary	(126/48)	10.973	0.323	3(255)
	b) Secondary	(82/37)	0.776	0.378	
	c) Tertiary	(28/17)	10.7	0.001	
	d) No education	(19/3)	5.15	0.023	
Religion	a) Catholic	(108/43)	0.05	0.81	3(255)
	b) Protestant	(114/54)	0.471	0.49	
	c) Muslim	(15/3)	2.9	0.08	
	d) Others	(17/5)	1.72	0.188	

Analysis of the factors associated with nonadherence among the patients revealed that forgetting treatment was the most cited factor (X^2=24.28). Feeling better after some medication period, being too ill to take medication, stigma associated with taking ART medication, alcohol consumption and drug stock out were also identified to be associated to non-adherence among the study participants as shown in Figure 1. To prove causalities amongst the observed factors, the odd ratios and p values of each variable were examined. Results showed that forgetting treatment, felt better and alcohol consumption among the concerned patients were strongly related to missing HIV treatment (P value less than 0.05).
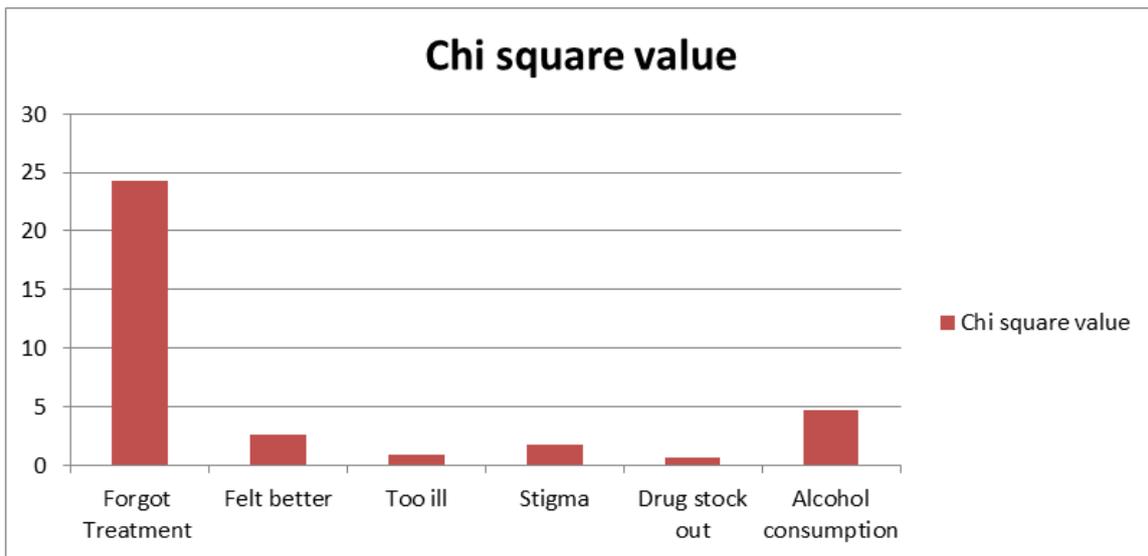
Figure 1. Chi square values of the factors associated with non-adherence to ART treatment Analysis of adherence levels

Most of the patients in this study (150, 58.8%) had good adherence, followed by those who had fair rates of adherence (60, 23.5%). Forty-five patients (17.6%) had the least adherence level as shown in Figure 2. Non-adherent female participants (62/105) out-numbered the non-adherent male participants (43/105).
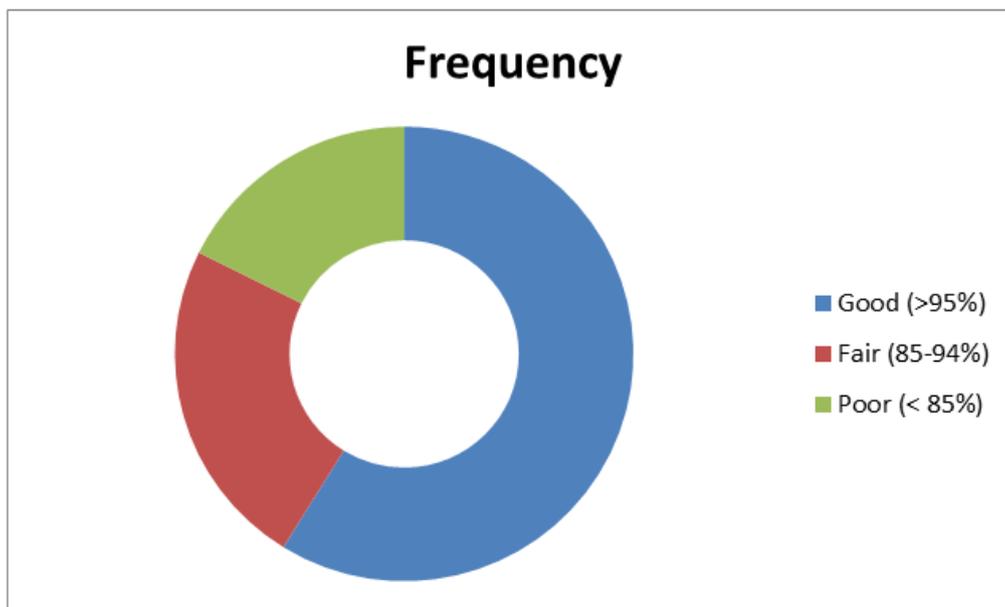

Figure 2. Adherence levels among the study participants

3.1. Analysis of the Effects of Socio-demographic Factors Influencing Adherence

A chi-square test of goodness-of-fit was performed to determine whether each of the investigated socio-demographic variables had any association with adherence to ART medications. Findings showed that females were most likely to miss their medication. The age groups of 30-39 and 40-49 were the most likely not to adhere to medications compared to the other age groups while the 0-19 and above 50 years age groups were most likely not to miss their medication. The separated patients were more likely to miss medication compared to others. Patients who had attended only primary education and those who attended tertiary level of education were most likely to be non-adherent to medication.

4. Discussion

In the current study, factors associated with ART adherence among HIV patients attending the ART clinic of Kampala International University teaching hospital were investigated. Non-adherence was taken to mean skipping at least one dose of medicine. From the analysis of the self-report questionnaire, findings from the study showed that majority of the patients were adherent to ART medication (adherence of more than 95%). Similar findings have been reported elsewhere [23,24,25,26], where adherence by more than half of the patients was observed. The findings from our study also noted poor adherence to be occurring among forty five patients, which represented 17.6% of the total number of patients.

Such patients stand the risk of compromising the efforts to effectively manage their health, in addition to making the virus to develop resistance to the ARVs. Various factors influencing patient adherence to medication were also investigated in this study. Forgetting treatment, feeling better after some medication period, being too ill to take medication, stigma associated with taking ART medication, alcohol consumption and drug stock out were commonly mentioned as the reasons for non-adherence. Studies done in other locations have also identified some of these same factors as hindrances to adherence among HIV patients [23,27]. Stigmatization of HIV patients has been pointed out to be a great determinant for adherence, since it leads to patients being unwilling or even fearful to take medication especially when other people are present in the vicinity [28]. In other settings, HIV related stigma prevented patients from going to the clinics to get medications because they became reluctant to letting other people see any activity that could disclose their HIV status [29]. From our study, various socio-demographic factors were also identified which contributed to the levels of adherence to ART medication. Females were more likely to miss their medication as compared to their male counterparts. These findings are consisted with other studies from Ethiopia and Canada, which reported low adherence levels in female subjects. The Ethiopian study pointed out that the burden of daily household activities could have contributed to a higher level of forgetting to take medication among women [23]. The findings in our study showed that the age groups of 30-39 and 40-49 were the most likely not to adhere to medications compared to the other age groups while the 0-19 and above 50 years age groups were most likely not to miss their medication. The separated patients were more likely to miss medication compared to others. These findings are however not in agreement with other previous studies which have indicated that age, sex and marital status were not determinants of adherence among HIV patients [30,31,32]. Patients who had attended just primary education and those who attended tertiary level of education were most likely to be non-adherent to medication. These findings are in total disagreement with the studies done elsewhere which found out that the adherence rate in the participants increased with their level of education [33,34]. These findings suggest that intentional interventions are needed among individuals of all levels of education to re-emphasize the highly valued concept of adherence to ART medication. Various healthcare campaigners need to determine which method would work out well in the varied groups of HIV patients, considering that the educational level does influence the way in which health related messages are perceived by individuals. It has been pointed out from other studies that people who are better educated are generally better endowed with access to information and hence can make better informed choices [35]. These results from our study show that both patient factors and socio-demographic factors affect adherence to ARV medications in a combined way. These factors must therefore be taken seriously during of ART treatment. Where possible , because of the sensitivity of the particular age group of 30-39 and 40-49 years showing difficulty in adhering to medication, the clinics should consider alternative public health approaches like linking patients within this age group to social support system that enables adherence to medications.

Evidence in other studies has shown that low social status defined as: low income level, low level of education and unemployment were directly related to no adherence. Drawing on this observation, the findings from our study can suggest that most of the patient who did not adhere to medications were most likely to be poor and could have failed to raise transportation to the HIV clinic. Lack of transportation to clinics has arguably been noted to be an important barrier to adherence to ART medication [24]. Various strategies have been suggested by other authors in order to improve the ART medication adherence levels among HIV patients, though published information on the effectiveness of such strategies remains fairly limited, particularly in resource-poor settings like sub-Saharan Africa. These strategies include decreasing the number, size, number and frequency of pills taken on each day. Interestingly, these kinds of strategies have been suggested as a means of reducing the HIV-related stigma that patients often get [36]. Another study from Kenya has recommended mobile phone messages as an inexpensive and convenient way of supporting HIV patients in their ART treatment compliance [37].

5. Conclusion

In conclusion therefore, although the level of adherence to treatment among the study participants was generally good, deliberate measures need to be taken to cater for the non-adherent patients. This is especially so, because non-adherence has its own, and sometimes fatal consequences. Interventions aimed at the high-risk non-adherence groups need to be specifically developed and targeted at the correct audience.

Acknowledgements

Competing Interests

The authors have no competing interests.

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